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Certificate No.: T- 4358

DETERMINATION OF FLAKINESS INDEX AND ELONGATION INDEX OF COARSE AGGREGATE (IS 2386 (Part 1) 1963 (RA 2007)

Lab ID	:	**CP-RW-2017-04-15-04** **Date: 16-04-2017**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th & 5th cross roads of Attur Ward No.03
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.
Customer Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18
Source of Sample	:	Sample supplied by Agency
Sample Condition	:	Satisfactory
Date of Receipt	:	15-04-2017
Sample ID No	:	2017-04-15-04/01
Type of Mix	:	Coarse Aggregate for DBM (Dense Bituminous Macadam)
Date of test	:	15-04-2017

Result:

Index	Percentage of Flakiness and Elongation Index	Secified limits as per MORTH specification table 500-8
Flakiness Index	13.6%	Combined Flakiness & Elongation Index for DBM is Maximum 35%
Elongation Index	14.4%	
Combined Flakiness and Elongation Index for DBM	28.0%	

Note:-
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Prepared By:
Harshitha

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Certificate No.: T- 4358

TESTS RESULTS ON AGGREGATE IMPACT VALUE
(IS:2386 Part IV)

Lab ID	:	**CP-RW-2017-04-15-04** **Date: 16-04-2017**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th & 5th cross roads of Attur Ward No.03
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.
Customer Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18
Source of Sample	:	Sample supplied by Agency
Sample Condition	:	Satisfactory
Date of Receipt	:	15-04-2017
Sample ID No	:	2017-04-15-04/01
Type of Mix	:	Coarse Aggregate for DBM(Dense Bituminous Macadam)
Date of test	:	15-04-2017

SLNo	Particulars of observations	Index	TEST 1	TEST 2
1	Total weight of the surface dry sample sample (passing 12.5 mm and retained on 10mm sieve)	A	311.7	311.5
2	Weight of fraction passing 2.36mm sieve After giving 15 blows	B	71.9	77.2
3	weight of fraction retained 2.36mm sieve After giving 15 blows	C	239.1	233.5
4	Total weight of (B+C) is less than the initial weight (Weight A) by more than one gram the result shall be discarded and a fresh test made.	A-(B+C)	0.7	0.8
5	Aggregate impct value	(B/A)*100	23.07	24.78
6	Aggregate impct value (Mean of two tests)		23.93	

Note:-
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TESTS RESULTS ON STABILITY OF MIX

Lab ID	:	**CP-RW-2017-04-15-04** **Date: 16-04-17**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th & 5th cross roads of Attur Ward No.03
Customer Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18
Source of Sample	:	Hot Mix Plant, Bangalore
Sample Condition	:	Satisfactory
Date of Receipt	:	15-04-17
Sample ID No	:	2017-04-15-04/01
Type of Mix	:	DBM (Dense Bituminous Mecadam)
Date of test	:	15-04-17

The results of the tests conducted on the Dense Bituminous Macadam mix sample are as follow

Sl.No	Particulars of observations	TEST 1	TEST 2	Secified limits as per MORTH specification table 500-11
1	Marshal Stability at 60°C, KN	10.9	11.18	9KN(min)
2	Marshal flow at 60°C, mm	3.10	3.30	2-4
3	Percent air Voids	4.90	4.20	3-5
4	Percent Voids in mineral Aggregate(VMA %)	14.5	14.8	13-15
5	Percent Voids filled with Bitumen(VFB %)	72.2	71.90	65-75
6	Density, g/cc	2.30	2.39	–

Note:-
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TEST REPORT OF AGGEGRATE STRIPPING VALUE OF ROAD AGGRGATE (IS:6241)

Lab ID	:	**CP-RW-2017-04-17-04**	**Date: 21-04-2017**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.	
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.	
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th and 5th cross roads of Attur Ward No.03	
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.	
Customer Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18	
Source of Sample	:	Sample supplied by Agency	
Sample Condition	:	Satisfactory	
Date of Receipt	:	17-04-2017	
Sample ID No	:	2017-04-17-04/01	
Type of Mix	:	BC (Bituminous Concrete)	
Date of test	:	17-04-2017	

Type of Binder	:	60/70
% of Binder Used	:	5.0%
Weight of Aggregate	:	200.0 gm
Weight of Binder	:	10.0 gm
Temperature of water bath	:	40°C

No of test	Retained Stripping Percentage	Stripping Percentage	Average Retained Stripping Percentage	Secified limits as per MORTH specification table 500-S
1	96.5	3.5	96.7	Minimum Retained Coating 95%
2	96.5	3.5		
3	97.0	3.0		

Note:
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TEST RESULTS OF GRADATION FOR BC
IS 2386 (Part 1) 1963 (RA 2007)

Lab ID	:	**CP-RW-2017-04-17-04** **Date: 21-04-17**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th and 5th cross roads of Attur Ward No.03
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.
Customer Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18
Source of Sample	:	Sample supplied by Agency
Sample Condition	:	Satisfactory
Date of Receipt	:	17-04-17
Sample ID No	:	2017-04-17-04/01
Type of Mix	:	BC-Plant (Bituminous Concrete)
Date of test	:	17-04-17
Oven Dry Weight(gm)	:	5000

IS Sieve Size (mm)	Weight Retained (gm)	Comulative Weight Retained (gm)	Comulative % of Retained	Comulative % of Passing	Secified limits as per MORTH specification table 500-17(grading-2)
19	0	0	0.0	100.0	100
13.2	165	165	3.3	96.7	90-100
9.5	585	750	15.0	85.0	70-88
4.75	897	1647	32.9	67.1	53-71
2.36	852	2499	50.0	50.0	42-58
1.18	622	3121	62.4	37.6	34-48
0.6	289	3410	68.2	31.8	26-38
0.3	463	3873	77.5	22.5	18-28
0.15	322	4195	83.9	16.1	12-20
0.075	466	4661	93.2	6.8	4-10
PAN	339	5000	100	0.0	0

Note:
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TEST REPORT ON BITUMEN

Lab ID	:	**CP-2017-04-15-04**	**Date: 19-04-2017**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.	
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.	
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th & 5th cross roads of Attur Ward No.03	
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.	
Customer's Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18	
Source of Sample	:	Sample supplied By Agency	
Sample Condition	:	Satisfactory	
Date of Receipt	:	15-04-2017	
Sample ID No	:	2017-04-15-04/01	
Sample Type	:	Bitumen	
Reference to BIS codes	:	IS: 1201-1220(1978) (Reaffirmed-2004)	
Date of test	:	15-04-2017	

Test Results

Sl.no	Name of Test	Result	Requirements as per IS:73-2013
1	Penetration at 25°C , in 1/10th mm	67	60 to 70
2	Softening Point, °C	51.6	Min. 40°C
3	Ductility, cm	100+	Min. 75cm
4	Flash point, °C	234.5	Min. 220°C
	Fire point, °C	253.5	

Note:
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Quality Manager

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TESTS RESULTS ON AGGREGATE IMPACT VALUE
(IS:2386 Part IV)

Lab ID : **CP-RW-2017-04-17-04** **Date: 21-04-2017**

Customer : Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.

Address : Yelahanka Satellite Sub Division, BBMP, Bangalore.

Project Name : Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th and 5th cross roads of Attur Ward No.03

Agency : Technical Manager(West), KRIDL, BBMP, Bangalore.

Customer Reference : BBMP/EE(YNK.D)/W.O/138/2017-18

Source of Sample : Sample supplied by Agency

Sample Condition : Satisfactory

Date of Receipt : 17-04-2017

Sample ID No : 2017-04-07-04/01

Type of Mix : Coarse Aggregate for BC (Bituminous Concrete)

Date of test : 17-04-2017

SLNo	Particulars of observations	Index	TEST 1	TEST 2
1	Total weight of the surface dry sample sample (passing 12.5 mm and retained on 10mm sieve)	A	299	299.3
2	Weight of fraction passing 2.36mm sieve After giving 15 blows	B	70.6	67.9
3	weight of fraction retained 2.36mm sieve After giving 15 blows	C	227.8	230.7
4	Total weight of (B+C) is less than the initial weight (Weight A) by more than one gram the result shall be discarded and a fresh test made.	A-(B+C)	0.6	0.7
5	Aggregate impct value	(B/A)*100	23.61	22.69
6	Aggregate impct value (Mean of two tests)		23.15	

Note:-
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DETERMINATION OF FLAKINESS INDEX AND ELONGATION INDEX OF COARSE AGGREGATE (IS:2386 Part 1)

Lab ID	:	**CP-RW-2017-04-17-04** **Date: 21-04-2017**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th and 5th cross roads of Attur Ward No.03
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.
Customer Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18
Source of Sample	:	Sample supplied by Agency
Sample Condition	:	Satisfactory
Date of Receipt	:	17-04-2017
Sample ID No	:	2017-04-17-04/01
Type of Mix	:	Coarse Aggregate for BC (Bituminous Concrete)
Date of test	:	17-04-2017

Index	Percentage of Flakiness and Elongation Index	Secified limits as per MORTH specification table 500-16
Flakiness Index	13.2%	Combined Flakiness & Elongation Index for BC is Maximum 35%
Elongation Index	11.3%	
Combined Flakiness and Elongation Index for BC	24.5%	

Note:
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Certificate No.: T- 4358

SPECIFIC GRAVITY AND WATER ABSORPTION TEST
(IS:2386 Part III)

Lab ID : CP-RW-2017-04-17-04 **Date: 21-04-2017**
Customer : Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.
Address : Yelahanka Satellite Sub Division, BBMP, Bangalore.
Project Name : Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th and 5th cross roads of Attur Ward No.03
Agency : Technical Manager(West), KRIDL, BBMP, Bangalore.
Customer Reference : BBMP/EE(YNK.D)/W.O/138/2017-18
Source of Sample : Sample supplied by Agency
Sample Condition : Satisfactory
Date of Receipt : 17-04-2017
Sample ID No : 2017-04-17-04/01
Type of Mix : Coarse Aggregate for BC (Bituminous Concrete)
Date of test : 17-04-2017

SLNo	Details of Observations	Index	Unit	Test 1	Test 2	Mean Value
1	Weight of Wet aggregates + Basket suspended in water	A1	grams	2230	2205	
2	Weight of Empty Basket suspended in water	A2	grams	791	728	
3	Weight of Aggregates in water	A=A1-A2	grams	1439	1477	
4	Weight of Saturated Surface Dry aggregate	B	grams	2359.2	2359	
5	Weight of oven dried aggregate	C	grams	2353	2353	
6	Specific gravity	C/(B-A)		2.56	2.67	2.61
7	Apparent Specific gravity	C/(C-A)		2.57	2.69	2.63
8	Water absorption	100*(B-C) /C	Percent	0.26	0.25	0.26

Note:-
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TEST RESULTS OF GRADATION FOR BC
IS 2386 (Part 1) 1963 (RA 2007)

Lab ID	:	**CP-RW-2017-04-17-04** **Date: 21-04-2017**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th and 5th cross roads of Attur Ward No.03
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.
Customer Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18
Source of Sample	:	Sample supplied by Agency
Sample Condition	:	Satisfactory
Date of Receipt	:	17-04-2017
Sample ID No	:	2017-04-17-04/01
Type of Mix	:	BC-Plant (Bituminous Concrete)
Date of test	:	17-04-2017
Oven Dry Weight(gm)	:	5000

IS Sieve Size (mm)	Weight Retained (gm)	Comulative Weight Retained (gm)	Comulative % of Retained	Comulative % of Passing	Secified limits as per MORTH specification table 500-17(grading-2)
19	0	0	0.0	100.0	100
13.2	165	165	3.3	96.7	90-100
9.5	585	750	15.0	85.0	70-88
4.75	897	1647	32.9	67.1	53-71
2.36	852	2499	50.0	50.0	42-58
1.18	622	3121	62.4	37.6	34-48
0.6	289	3410	68.2	31.8	26-38
0.3	463	3873	77.5	22.5	18-28
0.15	322	4195	83.9	16.1	12-20
0.075	466	4661	93.2	6.8	4-10
PAN	339	5000	100	0.0	0

Note:
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TEST RESULTS OF GRADATION FOR BC
IS 2386 (Part 1) 1963 (RA 2011)

Lab ID	:	**CP-RW-2017-04-22-04** **Date: 25-04-2017**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th & 5th cross roads of Attur Ward No.03
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.
Customer Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18
Source of Sample	:	Sample supplied by Agency
Date of Receipt	:	22-04-2017
Sample ID No	:	2017-04-22-04/01
Type of Mix	:	BC (Bituminous Concrete)
Date of test	:	22-04-2017

Sl.no	Description	Index	Trail 1	Trail 2
1	Weight of the Sample	A	503	502
2	Weight of the sample After extraction	B	473	475
3	Bitumen percentage	$\frac{A-B}{A} \times 100$	5.96	5.38
4	Average percentage	%	5.7	

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Prepared By:
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Lab ID : CP-RW-2017-04-22-04 **Date: 25-04-2017**

Sample ID : 2017-04-22-04/01

AFTER EXTRACTION - Trail-1

Total Weight of the Sample(gm) : 473

IS Sieve Size (mm)	Weight Retained (gm)	Comulative Weight Retained (gm)	Comulative % of Retained	Comulative % of Passing	Secified limits as per MORTH specification table 500-23(grading-2)
19	0	0	0.0	100.0	100
13.2	2	2	0.4	99.6	90-100
9.5	64	66	14.0	86.0	70-88
4.75	114	180	38.1	61.9	53-71
2.36	85	265	56.0	44.0	42-58
1.18	26	291	61.5	38.5	34-48
0.6	13	304	64.3	35.7	26-38
0.3	54	358	75.7	24.3	18-28
0.15	35	393	83.1	16.9	12-20
0.075	55	448	94.7	5.3	4-10

AFTER EXTRACTION - Trail-2

Total Weight of the Sample(gm) : 475

IS Sieve Size (mm)	Weight Retained (gm)	Comulative Weight Retained (gm)	Comulative % of Retained	Comulative % of Passing	Secified limits as per MORTH specification table 500-23(grading-2)
19	0	0	0.0	100.0	100
13.2	1	1	0.2	99.8	90-100
9.5	65	66	13.9	86.1	70-88
4.75	118	184	38.7	61.3	53-71
2.36	84	268	56.4	43.6	42-58
1.18	29	297	62.5	37.5	34-48
0.6	11	308	64.8	35.2	26-38
0.3	56	364	76.6	23.4	18-28
0.15	37	401	84.4	15.6	12-20
0.075	52	453	95.4	4.6	4-10

Note:
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Samples will be disposed after 30 days from the date of issue of test certificate

AE W3

Prepared By:
Harshitha

AE-03

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R KARTHIK RECHAN
Authorized Signatory
Quality Manager

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TEST RESULTS OF GRADATION FOR BC
IS 2386 (Part 1) 1963 (RA 2011)

Lab ID	:	**CP-RW-2017-04-22-04**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th & 5th cross roads of Attur Ward No.03
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.
Customer Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18
Source of Sample	:	Sample supplied by Agency
Date of Receipt	:	22-04-2017
Sample ID No	:	2017-04-22-04/02
Type of Mix	:	BC (Bituminous Concrete)
Date of test	:	22-04-2017

Date: 25-04-2017

Sl.no	Description	Index	Trail 1	Trail 2
1	Weight of the Sample	A	505	503
2	Weight of the sample After extraction	B	477	475
3	Bitumen percentage	$\frac{A-B}{A} \times 100$	5.54	5.57
4	Average percentage	%	5.6	

AE W3

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HIGHWAY & BUILDING MATERIALS TESTING LABORATORY | STRUCTURAL|
GEO TECHNICAL| PROJECT MANAGEMENT| SURVEYING SERVICES|

Lab ID : CP-RW-2017-04-22-04
Sample ID : 2017-04-22-04/02
Date: 25-04-2017

AFTER EXTRACTION - Trail-1

Total Weight of the Sample(gm) : 477

IS Sieve Size (mm)	Weight Retained (gm)	Comulative Weight Retained (gm)	Comulative % of Retained	Comulative % of Passing	Secified limits as per MORTH specification table 500-23(grading-2)
19	0	0	0.0	100.0	100
13.2	0	0	0.0	100.0	90-100
9.5	70	70	14.7	85.3	70-88
4.75	110	180	37.7	62.3	53-71
2.36	59	239	50.1	49.9	42-58
1.18	42	281	58.9	41.1	34-48
0.6	47	328	68.8	31.2	26-38
0.3	60	388	81.3	18.7	18-28
0.15	32	420	88.1	11.9	12-20
0.075	34	454	95.2	4.8	4-10

AFTER EXTRACTION - Trail-2

Total Weight of the Sample(gm) : 475

IS Sieve Size (mm)	Weight Retained (gm)	Comulative Weight Retained (gm)	Comulative % of Retained	Comulative % of Passing	Secified limits as per MORTH specification table 500-23(grading-2)
19	0	0	0.0	100.0	100
13.2	6	6	1.3	98.7	90-100
9.5	102	108	22.7	77.3	70-88
4.75	85	193	40.6	59.4	53-71
2.36	89	282	59.4	40.6	42-58
1.18	27	309	65.1	34.9	34-48
0.6	18	327	68.8	31.2	26-38
0.3	52	379	79.8	20.2	18-28
0.15	26	405	85.3	14.7	12-20
0.075	42	447	94.1	5.9	4-10

Note:
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TESTS RESULTS ON STABILITY OF MIX

Lab ID	:	**CP-RW-2017-04-17-04** **Date: 21-04-17**
Customer	:	Assistant Executive Engineer, Yelahanka Satellite Sub Division, BBMP, Bangalore.
Address	:	Yelahanka Satellite Sub Division, BBMP, Bangalore.
Project Name	:	Asphalting to Roads and improvements to drains in Thirumalangara Main road 4th and 5th cross roads of Attur Ward No.03
Agency	:	Technical Manager(West), KRIDL, BBMP, Bangalore.
Customer Reference	:	BBMP/EE(YNK.D)/W.O/138/2017-18
Source of Sample	:	Hot Mix Plant, Bangalore
Sample Condition	:	Satisfactory
Date of Receipt	:	17-04-17
Sample ID No	:	2017-04-17-04/01
Type of Mix	:	BC (Bituminous Concrete)
Date of test	:	17-04-17

The results of the tests conducted on the Bituminous Concrete mix sample are as follow

Sl.No	Particulars of observations	TEST 1	TEST 2	Secified limits as per MORTH specification table 500-11
1	Marshal Stability at 60°C, KN	12.09	11.83	10KN(min)
2	Marshal flow at 60°C, mm	3.71	3.62	2-4
3	Percent air Voids	4.17	4.63	3-5
4	Percent Voids in mineral Aggregate(VMA %)	14.55	14.83	13-15
5	Percent Voids filled with Bitumen(VFB %)	73.02	72.11	65-75
6	Density, g/cc	2.35	2.36	–

Note:-
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Samples will be disposed after 30 days from the date of issue of test certificate

AE W3

Prepared By:
Harshitha

AE-01

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